NOISE ELEMENT

for the

City of Stanton

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T A B L E   O F   C O N T E N T S

INTRODUCTION

The impact of noise on the City of Stanton involves two important considerations: its effects on the livability of the City's environment; and its relationship to the design of the City. If housing is found to be undesirable because of adverse noise levels, high tenant turnover and neighborhood deterioration are likely to occur. Primary community noise sources are transportation-related; and the City of Stanton is traversed by nurmerous transportation routes. If the entire city environment becomes subject to noise pollution, the impairment of the economic health and growth potential of the City may follow, thereby reducing the desirability of the City as a place to live.

The Noise Element for the City of Stanton is an integrated part of the City's General Plan, contributing policies to guide the future development of Stanton. The preparation of the Noise Element satisfies the State of California Government Code Section 65302(g) which requires a Noise Element in all city and county General Plans.

The purpose of the Noise Element is to provide the City with quantitative information on existing and projected noise levels, establish goals and policies relating to noise, and create implementation programs for the control of noise in the City. The fundamental goal of the Noise Element is to provide a quality noise environment in the City of Stanton compatible with the health and welfare of its citizens and in a reasonable relationship to land use.

BACKGROUND

Noise is unwanted sound. Urban noise pollution is rapidly becoming recognized as major environmental problem. Cities are faced with growing numbers of noise pollutants such as trucks, motorcycles, aircraft, and all types of powered equipment.

Fundamental to the concern for noise is its harmful effects on man. A high noise level is a threat to man's physical and psychological well-being by its ability to pervade work leisure, and sleep.

The State of California recognized the seriousness of noise pollution by mandating a requirement of a Noise Element to the General Plan. Section 65302(g) requires "a noise element in quantitative, numerical terms, showing contours of present and projected noise levels associated with all existing and proposed major transportation elements...."

The control of noise has been hampered by the attempts of different jurisdictions to regulate the same sources of noise. The Noise Control Act of 1972 established respective jurisdictions for federal, state, and local governments. The State and local governments are given primary responsibility for noise control. However, federal jurisdiction is reserved for noise related to interstate and foreign commerce. Many of the major community noise sources such as airplanes, trucks, and railroads are under federal jurisdiction because they are associated with commerce. Local governments receive their

regulatory powers from their police power to protect the health and welfare of their citizens as long as the regulations are not preempted by federal and State laws.

Local government can play a significant role, however, in the control of noise sources by supporting federal and State efforts to control noise, and by regulating noise through its ability to control land use which is incompatible with high noise levels.

GOALS

THE PRIMARY GOAL OF THE NOISE ELEMENT OF THE CITY OF STANTON IS TO PROVIDE A QUALITY NOISE ENVIRONMENT COMPATIBLE WITH THE HEALTH AND WELFARE OF ITS CITIZENS AND IN A REASONABLE RELATIONSHIP TO LAND USE.

There are specific restraints that must be taken into account which will affect the goals and policies of the Noise Element. Physical factors such as little undeveloped land and irregular city boundary, and an elongated commercial highway complex have already set the development patterns in Stanton which severely limit the implementation of planning alternatives to reduce impacts due to noise. In addition, land use is determined by many complex issues, and each situation is unique. Many of the noise sources in the community which create incompatible land uses represent significant socio-economic vested interest which cannot be abandoned or restructured in a short period of time. For these reasons, it is prudent to plan a phased reduction of established noise sources through methods that are economically viable and technologically feasible while at the same time controlling new noise sources within desired limits of acceptability.

To attain the primary goal, the following are proposed:

1. GOVERNMENT

   Maximum local governmental effort in planning, developing, and enforcing a quality noise environment for present and future residents of the City.

2. GOVERNMENTAL COORDINATION

Coordinate intergovernmental efforts to abate noise through standards and regulations, uniform code interpretation and countywide enforcement and land use planning.

3. NOISE/LAND USE EVALUATIONS

Require noise evaluations in all land use considerations and applications of the building code and subdivision and zoning ordinances.

4. NOISE STANDARDS

Planning and enforcement standards to protect the health, welfare, and safety of all residents.

5. CITIZEN AWARENESS

Create citizen awareness of the seriouness of noise pollution and ways in which they can assist in reducing noise.

POLICIES

Utilizing these goals as a framework, a set of policies were formulated in areas of concern in which city governmental effort could be most effective. Policies provide a link between generalized goals and specification programs related to housing.

A. Creation Of Noise Strategies

Goals alone will not create a quality noise environment in the City. The City must develop specific strategies and priorities to reduce noise in noise-impacted areas.

B. Cooperation With Other Governmental Jurisdiction To Abate Noise

Intergovernmental cooperation is essential because noise does not respect jurisdictional boundaries. Noise from one city may affect residents of another city. The adoption of a regional approach to control noise will be the most effective noise abatement program.

C. Provision Of Noise-Conscious Municipal Services

The efforts of the City to provide quiet municipal services is important. This City should review its own functions and activities to insure that

noise from construction, maintenance, refuse collections, and street cleaning is reduced to the lowest possible noise level.

D. Development Of A Noise Information Service

The City can disseminate and collect information on noise to create citizen awareness and support for noise control programs. This is extremely important as the success of noise control programs depends on the voluntary compliance of the citizens. Periodic inspection and checks are all that can be implemented without prohibitive municipal costs. In addition, most municipal inspection will rely on the complaints and inquires of citizens to reveal violations. If this response can be linked with a reliable system of communication permitting citizens to report noise violations readily, the effectiveness of the noise control program will be increased.

PROGRAMS: THE IMPLEMENTATION PROCESS

The implementation process is the most important aspect of any planning process as it involves the actual fulfillment of the City's goals and policies.

A. Policy: Creation Of Noise Strategies Programs:

1. THE GENERAL PLAN - THE CITY SHOULD REVISE THE EXISTING GENERAL PLAN TO GIVE RECOGNITION TO NOISE.

   The present General Plan and other elements need to be revised as appropriate to give recognition to noise level/land use relationships and other relevant matters. Particular attention should be focused on the Land Use and Circulation Elements as the general distribution, location, and uses of land and transportation systems relate directly to noise levels.

2. NOISE ORDINANCE - ADOPTION AND ENFORCEMENT

   The most effective implementation program is the adoption and enforcement of a noise ordinance. The City of Stanton has adopted an ordinance based on the Orange Noise Ordinance. The City will utilize the services of the Orange County Health Department (OCHD) as an enforcement body. The adoption of the Orange

County Noise Ordinance and the service contract with the OCHD is beneficial in creating a uniform countywide approach to noise control.

B. Policy: Cooperation With Other Governmental Jurisdictions Programs:

1. COUNTY PLANNING - UNIFORM APPROACH TO NOISE CONTROL

The City of Stanton is supporting a countywide effort to abate noise through the adoption and enforcement of a county-based noise ordinance.

2. ENFORCEMENT OF ALL INTERGOVERNMENTAL NOISE LEGISLATION

The City should encourage strict enforcement of the noise standards in the Motor Vehicle Code and Uniform Building Code and other State and Federal legislation pertaining to noise.

C. Policy: Provisions Of Noise Conscious Municipal Services Programs:

1. LAND USE ACTIONS - THE CITY SHOULD GIVE SPECIAL CONSIDERATION TO NOISE-SENSITIVE USES IN ZONE CHANGES, SUBDIVISION AND CONDITIONAL USE PERMITS AND ENVIRONMENTAL IMPACT REPORTS.

2. NUISANCE ABATEMENT - THE CITY SHOULD CONTINUE TO ENFORCE THE NUISANCE CLAUSE FOR TRANSITORY NOISE PROBLEMS.

3. PURCHASING POLICY - THE CITY SHOULD PURCHASE QUIETER MACHINES AND VEHICLES FOR THE CITY AND REQUIRE QUIETER EQUIPMENT ON WORK PERFORMED ON CITY CONTRACTS WHERE FEASIBLE.

D. Policy: Noise Information Service Program:

1. CODE INFORMATION - CITY GOVERNMENT SHOULD MAKE ZONING AND BUILDING CODE INFORMATION AVAILABLE TO POTENTIAL PROPERTY OWNERS, DEVELOPERS, AND CITIZENS.

It is essential that City ordinance information is made accessible to citizens. Legal language must be interpreted by City Staff for application and use by the public.

ISSUES: NOISE IN STANTON

In studying and abating noise in Stanton, a number of issues emerge as important to the community: one, the existing noise environment; and two, acceptable community noise standards.

COMMUNITY NOISE ENVIRONMENT

The noise environment of the City of Stanton is created primarily by transportation sources. Noise generated by automobiles, trucks, motorcycles and trains emanates from the numerous transportation routes which traverse the City. Secondary noise sources in the community include industrial, construction and population activities. Population noise is the noise generated by human activity in the community. Noise sources in this category include air conditioning, law mowers, radio/television, and entertainment and commercial activities.

Preliminary to an effective noise control program is a description of the existing and projected noise environment in the community. To determine noise levels and noise sources in the City, two different types of data were processed and analyzed. First, the existing and projected transportation noise sources were identified from simulation models which compute the noise environment along transportation routes based on vehicle operating characteristics. This analysis is shown on two maps displaying transportation noise contours for the years 1974 and 1983 (see maps at end of text). The transportation contours indicate that transportation is the

primary noise source for the existing and projected environment for the community. Noise reduction technology will tend to offset increasing traffic volumes which normally would increase noise levels.

Secondly, in order to further identify noise sources and determine noise levels, a community noise survey was conducted July 19 to the 24th, 1974, by Olson Laboratories personnel. Acoustic measurements were taken at 21 sites through the community using the day-night Average Sound Level (L_{dn}) index. The L_{dn} index sums all noise energy in a 24-hour period with a weighting factor added to two time periods (day, 7:00 a.m. to 10:00 p.m. and night, 10:00 p.m. to 7:00 a.m.).

The 21 sites were monitored for residual and modal noise levels. The residual is the lowest noise level existing at the site in the absence of identifiable sources (i.e., background noise). By definition, the residual noise level is that level typical of the neighborhood in which the measurement is made.

The measurement sites included major intersections, railroads, residential, commercial, and industrial areas, parks, hospitals, and school campuses. These representative sites present wide coverage of existing community noise sources and provide baseline noise levels allowing the City of assess the resultant impact of any change in the community noise environment.

The community noise survey indicated that Stanton has residual noise levels equipvalent to an average suburban environment. On a citywide basis, Stanton has daytime residual noise levels ranging from 40 to 60 dBA. At night,

the residual noise levels range from 35 to 50 dBA. The noisiest areas in the City result from transportation sources.

COMMUNITY NOISE STANDARDS

The development of community noise standards requires consideration of several interrelated issues. Every community desires a quiet enviornment; however, achieving noise levels considered acceptable as a community standard is easier for some communities than it is for others.

Noise control standards and criteria should be consistent with those in noise enforcement. As desirable as it may be, it would be impractical to apply an enforcement standard that requires noise levels below current residual conditions. Standards should also reflect economic objectives as well as environmental objectives and be realistically enforceable from a legal and technical standpoint. The quest for desirable noise levels with adoption of noise standards will be aided by the application of noise reduction technology which may result in lowered community noise levels in the future.

Because Stanton is primarily a suburban residential community, it will give less accommodation to noise than would a heavily industrialized community. Regarding the effects of noise on man, there will be three distinct community considerations; health, annoyance, and quality. Stanton should not permit noise conditions that endanger the health of its citizens. Instead, Stanton should make every effort to provide noise levels that result in a quality noise living

environment with methods that are economically viable and technologically feasible.

The community noise survey and transportation simulation model indicated that Stanton has residual noise levels equivalent to an average suburban environment. The noisiest areas in the City result from transportation sources. In view of the noise environment of the City, the following approaches are incorporated into the City's program from environmental noise control:

- Adopt a maximum permitted level under any condition of land use that conforms to the levels requisite to protect public health.

- Adopt standards for planning and new construction that conform to noise levels acceptable for reliable speech communication.

- Adopt enforcement standards which are consistent with planning standards.

Table 1 presents the Basic Planning Standard to protect health and prevent activity interference for a variety of land uses encountered in the community. These standards give first priority to assuring that residential areas are free from excessive or annoying noise levels by establishing quantitative maximum permissible noise levels. These standards also meet the health and annoyance levels of the Federal and State noise standards as shown on Tables 6 and 7 in Appendix C.

TABLE 1 BASIC PLANNING STANDARD

	Measure	Indoor: Activity Interference	Indoor: Hearing Loss Consideration	Indoor: To protect against both effects (b)	Outdoor: Activity Interference	Outdoor: Hearing Loss Consideration	Outdoor: To protect against both effects (b)
Residential with outside space and Farm Residences	L_{dn}	45		45	55		55
	$L_{eq(24)}$		70			70	
Residential with no outside Space	L_{dn}	45		45			
	$L_{eq(24)}$		70				
Commercial	$L_{eq(24)}$	(a)	70	70(c)	(a)	70	70(c)
Inside Transportation	$L_{eq(24)}$	55		55			
	$L_{eq(24)}$		70				
Industrial	$L_{eq(24)}$(d)	(a)	70	70(c)		70	70(c)
Hospitals	L_{dn}	45		45	55		55
	$L_{eq(24)}$		70			70	
Educational	$L_{eq(24)}$	45		45	55		55
	$L_{eq(24)}$(d)		70			70	
Recreational areas	$L_{eq(24)}$	(a)	70	70(c)	(a)	70	70(c)
Farm Land and General Unpopulated Land	$L_{eq(24)}$				(a)	70	70(c)

Code:
a. Since different types of activities appear to be associated with different levels, identification of a maximum level for activity interference may be difficult except in those circumstances where speech communication is a critical activity.
b. Based on lowest level.
c. Based only on hearing loss.
d. An $L_{eq(8)}$ of 75 dB may be identified in these situations so long as the exposure over the remaining 16 hours per day is low enough to result in a negligible contribution to the 24-hour average, i.e., no greater than an L_{eq} of 60 dB.

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A basic reference document for builders showing the fire resistance, sound transportation rating and

construction forms for a large number of combinations of gypsum wallboard, fiberglass and stud arrangements.

"Designing Glass Units for Sound Reduction," Sound and Vibration. September 1973. pp. 38-39.

Laminated and double-glazed glass units provide improved acoustical performance over monolithic units. Basic guidelines for designing glass units with predictable acoustical ratings are presented.

"Improved Acoustical Privacy in Multi-Family Dwellings," Sound and Vibration. September 1973. pp. 30-37.

Acoustical privacy between adjoining spaces in a multi-family dwelling involves the related concepts of acoustical flanking, the level of noise in the receiving room, and the response of the listener.

Inglewood, California. Environmental and Economic Analysis of an Acoustical Treatment Ordinance. June 1972.

A report which analyzes the environmental and economic factors associated with the adoption of the acoustical treatment (soundproofing) ordinance proposed for the aircraft noise zones in Inglewood.

"Low-Cost Acoustical Enclosures for a Wood Planer," Sound and Vibration. November 1973, pp. 34-38.

A lumber mill wood planer was enclosed to reduce noise exposure of operators to acceptable values.

Uniform Building Code. 1973 Ed. Sacramento: State Publishing Office. 1973.

Chapter 35 of the Uniform Building Code gives noise insulation standards.

Wyle Laboratories. A Guide to Soundproofing of Existing Homes Against Exterior Noise. Report No. WCR 70-2. Los Angeles. 1970.

Contains architectural diagrams and instructions for construction of various wall and floor panels as well as sound-transmission-class ratings for cases discussed.

FEDERAL AND STATE REGULATIONS

Federal Register. Vol. 37, Nos. 202 and 243. October and December 1972.

Included in these issues are occupational noise exposure standards which discuss the duration of permissible noise exposure levels as well as hearing protection requirements of the federal government.

"Proposed Occupational Safety and Health Administration Noise Regulations," Sound and Vibration. November 1973. pp. 24-28.

Proposed occupational noise regulations are presented as revised by the Occupational Safety and Health Administration, Standards Advisory Committee on Noise. The proposed regulations are prefaced by critical comments by authorities.

U.S., Department of Housing and Urban Development. Noise Abatement and Control: Department of Policy, Implementation Responsibilities, and Standards. 1390.2 September 1971.

This circular establishes noise exposure policies and standards to be observed in the approval or disapproval of all HUD projects.

________. Noise Assessment Guidelines. August 1971. 20 pp.

This booklet provides a procedure which may be used to assess exposure of housing to present and future noise conditions. These conditions include aircraft, roadway and railroad noise.

U.S., Environmental Protection Agency. Office of Noise Abatement and Control. Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety. Draft No. 2. Washington, D.C.: Government Printing Office.

This document provides the basis upon which the EPA believes communities should base local standards and criteria for noise abatement and control.

U.S., Environmental Protection Agency. Summary of Noise Programs in the Federal Government. December 1971.

The activities of various federal agencies involved in noise abatement and control are discussed. The agencies primarily responsible for noise control are Defense, NASA, HEW, HUD, and EPA. The extent of the authority and impact upon the field of noise abatement and control of these agencies is outlined.

________. Technology and Economics of Noise Control: National Programs and their Relationship with State and Local Programs. November 1971. 515 pp.

A collection of statements from public hearings on noise abatement and control conducted by the EPA. Contains a section on truck tire noise. (p. 365)

LOCAL REGULATIONS

Bragdon, Clifford R. "Municipal Noise Ordinances," Sound and Vibration. Vol. 7, No. 12. December 1973.

Compilation of the standards in a number of municipal noise ordinances used throughout the U.S.

La Habra, City Noise Element. September, 1974.

Los Angeles, County of Noise Element. (Preliminary) July, 1974.

Stanton, City of Noise Element. September, 1974

Citizen Attitudes About Urban Issues

Sample social study of Mashville, Tennessee, in which the public attitude about schools, housing, services, public facilities, and plan services are surveyed. Contains observations on community noise.

Galloway, William J. and Dwight E. Bishop. Noise Exposure Forecasts, Evolution, Evaluation and Extensions and Land Use Interpretations. Van Nuys: Department of Transportation, 1970.

One of the original attempts to relate the concept of daily noise exposure to acceptable land uses. This methodology still is widely used in airport analyses.

League of California Cities. League Model Noise Ordinance. Sacramento: State Publishing Office. 1970.

A model ordinance suggested for use in California cities. Covers most basic aspects of regulations currently of interest.

Sieveking, N. S. Urban Observatory of the University of Tennessee. Prepared for the U.S., Department of Housing and Urban Development. June 1974.

Tracor, Inc. Guidelines on Noise. Medical Research Report EA 7301. American Petroleum Institute.

A specialized document relating primarily to individual noise control techniques. Principally for products in the petroleum industry.

U.S., Environmental Protection Agency. Urban Planning, Architechtural Design, and Noise in the Home. August 197. 174 pp.

A collection of statements from public hearings conducted by the EPA on noise abatement and control. These hearings dealt mainly with urban planning, architectural design, and noise in the home.

COMMUNITY NOISE

Branch, Melville C. Outdoor Noise and the Metropolitan Environment. Los Angeles: Department of City Planning. 1970.

A document which provides an understanding of the scope of noise instrusions into the Los Angeles Basin. Easily understood by laymen with many interesting graphical portraints of noise impact.

Inglewood, California. Community Noise Study — Inglewood. 1972.

Measurement of 35 locations throughout the City of Inglewood on a 24 hour basis.

Parker, P. J., et al. "London Noise Survey," Building Research Station Report. London: HMSO, 1968.

Comprehensive survey of noise in the London area. Provides interest and comparison for similar-sized U.S. cities.

U.S., Department of Housing and Urban Development. Noise in Urban and Suburban Areas: Results of Field Studies. Washington, D.C.: Government Printing Office. 1967.

A series of recordings in various community locations provides some basis for judging the adeqaucy of the Housing and Urban Development noise assessment guidelines.

Wyle Laboratories. Community Noise. U.S., Environmental Protection Agency. December 1971.

This report describes the outdoor noise environment, intruding noises, community reaction to and growth of noise pollution.

NOISE ENFORCEMENT

Heath, Warren M. _California's Experience in Vehicle Noise Enforcement_. California Highway Patrol. May 1972. 26 pp.

A report which discusses California's Highway Patrol experience in enforcement of vehicle noise problems.

Appendix A

GLOSSARY

Appendix A

GLOSSARY

1. A-Weighted Sound Level (dBA) — a unit of sound measurement in which a single number represents the human ear's response to sound. This is accomplished by a weighting network, signified as "A", assigned to the appropriate frequency bands and thereby reducing the effects of the low and high frequencies with respect to the medium frequencies. Sound level meters with an A-weighted scale are used for community noise measurement with units being expressed as dBA.

2. Ambient Noise — The total level of all noise near and far, in a given system or environment, independent of the specific source being measured.

3. Audible Range of Frequency — The normal frequency range of human hearing encompassing 16 Hz to 20,000 Hz.

4. Community Noise Equivalent Level (CNEL) — A cummulative measure of community noise exposure for a 24-hour day, using the A-weighting sound level and expressed in logarithmic units. This CNEL scale takes into account the single event sound level, single event duration, single event occurence frequency, and the time of the occurence of the noise source. It additionally, applies weighting factors which place greater significance on noise events occuring in the nighttime (10 p.m. to 7 a.m.) than during the evening (7 p.m. to 10 p.m.) or daytime (7 a.m. to 7 p.m.) respectively. It is used for for evaluating noise impact on an area.

5. Composite Noise Rating (CNR) — A 24-hour cummulative noise exposure method used for evaluating noise impact around airport facilities. It is primarily utilized by the Department of Defense in predicting noise environments around military airfields. Similar, mathematically to CNEL but without single event duration correction no accountability for evening weighting, and a difficult nighttime weighting.

6. Day-Night Average Sound Level (L_{dn}) — A 24-hour A-weighted cummulative noise exposure method similar to CNEL but only applies a time of day weighting to the nighttime period (10 p.m. to 7 a.m.).

7. Equivalent Sound Level (L_{eq}) — The level of a constant sound, which over a given time interval and situation which has the same sound energy as a time-varying sound. Usually related to period of time over which average is taken.

8. Frequency — The number of times per second in which a sine wave is repeated, expressed in a measurement unit called Hertz (Hz).

9. Mode Noise Level — The most frequently occuring noise level in any specified time interval.

10. Noise — Annoying, harmful or unwanted sound.

11. Noise Attenuation — The ability of a medium to reduce the level of a noise source, specified in decibels (dB) of transmission loss usually in octave frequency bands..

12. Noise Contour — A line connecting points of equal noise level as measured on the same scale.

13. Noise Exposure Forecast (NEF) — A 24-hour cummulative noise exposure method similar to CNR but with corrections for single event duration and pure tone components in sound source spectrum. Used almost exculsively for characterizing community impact to aircraft noise.

14. Noise Exposure Index (NEI) — The general mathemtaical form for L_{eq}, CNEL, CNR, NEF, and L_{dn}.

15. Noise Impacted Area — A specific area exposed to substantial levels of noise, usually described by a cummulative exposure rating scale.

16. Noise Performance Standards — A standard based on permitted emissions rather than on the category or type of land use.

17. Noise Sensitive Land Uses — Noise sensitive land uses include but are not limited to: residential hospitals, schools, libraries, churches, unsoundproofed offices, hotels and motels and outdoor recreational areas. The use of land in which individuals are or can be particularly affected by noise is determined by such factors as psychological impairment, sleep disturbance, speech and talk interference and annoyance.

18. Maximum Noise Level — The maximum instantaneous level that occurs during a specified time interval. In acoustics, maximum sound pressure is to be understood for single events unless some other kind of level is specified.

19. Sound — As used herein, a reaction in the ear caused by mechanical radiant energy of a source transmitted by longitudinal pressure waves in air or other elastic medium.

20. Sound Level Meter — A measurement instrument, containing a microphone, an amplifier, an output meter, and one or more frequency weighting networks which is used for the determination of noise and sound levels.

Appendix B

EFFECTS OF NOISE ON HUMANS

Appendix B

EFFECTS OF NOISE ON HUMANS

Not a day goes by in which people are not bombarded by a multitude of sound in an urban environment. Many of these sounds are desirable and necessary for day to day activities, but unfortunately, most sounds such as vehicular, aircraft, industrial, and air conditioning units are undesirable and can also be detrimental to health.

Since the advent of the industrial age, the urban environment has been increasingly exposed to the by-products of technology, namely air and water pollution. Recently noise has emerged as the third major pollutant. It invades all areas and aspects of the environment. For example, the neighbor with the power lawn mower, the teenager with the motorcycle, and the barking dog all testify to this intrusion of privacy.

Solutions to the noise problem may seem simple at first glance, but upon further examination it can be seen that abatement is an extremely complex endeavor. First, there is a problem in the identification of the noise source. Most sources are identified as nuisances to the community, but noise is unwanted sound and therefore subject to individual likes and dislikes.

Second, there is the problem of noise measurement. Acoustical engineers have solved this problem with the utilization of metering devices to measure the level of sound. The most widely used metering device is the "A-weighted" sound level meter (dBA). Basically, this instrument simply measures the sound pressure from a noise sources and is set up with a filter to respond to the sound energy the same as a normal human ear.

The standard unit of measurement is called decibels and is used to designate varying levels of sound. The human ear can detect sounds from the threshold of hearing up to 10,000,000,000,000 times as intense. The use of measurement units on this magnitude would be unmanageable, therefore, decibels are based on a logrithmic scale. For example, a jet flyover at 1,000 feet (102 dBA) is eight times as loud as a vacuum cleaner (70 dBA), rather than one-quarter greater as the number would appear to indicate. (See Figure 1 on the following page.)

Third, one of the greatest problems in noise analysis is relating noise exposure to community health and welfare, and determining adequate maximum noise levels for the protection of the citizens well being. Though there has been some dispute in the scientific community regarding the detrimental effect of noise, specific conclusions in some areas of noise effects have been reached.

Physiological

Hearing loss is directly related to the extent of exposure to sound levels and to the period of time. A temporary loss of hearing is a frequent occurence in our urban environment. Exposure to such common noise sources as power tools (100 dBA), rock-n-roll music (110 dBA), and food blenders (88 dBA) can cause a temporary impairment to normal hearing for a period as short as 1 hour or as long as several days. Extremely loud noises of a short duration can result in the same phenomenon, and is usually characterized by a ringing sensation in the ear.

Permanent hearing loss can arise if an individual is continuously exposed to moderate to high noise levels (comparable to those cited above) over a given period of time.[1] Such incidences commonly occur and are well documented in occupational, industrial settings.

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[1] Continuous exposure consists of a daily exposure for several hours over a minimum of 1 year.

	dBA	
	150	
	145	
	140	Sonic Boom
EXTREMELY LOUD	135	
	130	
	125	Jet Takeoff at 200'
	120	Oxygen Torch
	115	Discotheque
	110	Motorcycle at 20'
	105	Power Mower
VERY LOUD	100	Newspaper Press
	95	Freight Train at 50'
	90	Food Blender
	85	Electric Mixer, Alarm Clock
	80	Washing Machine; Garbage Disposal
	75	Freeway Traffic at 50'
	70	Average Traffic at 100'
LOUD	65	Electric Typewriter at 10'
	60	Dishwasher at 10'; Air Conditioning Unit
	55	Normal Conversation
	50	Large Transformers
	45	Light Traffic at 100'; Refrigerator
	40	Bird Calls
	35	Library
	30	
QUIET	25	
	20	Motion Picture Studio
	15	
	10	Leaves Rustling
	5	
THRESHOLD OF HEARING	0	

Figure 1 NOISE SCALE

Once the hearing mechanism is permanently damaged, it cannot regenerate, thus, deafness is not a recoverable illness. Hearing aids can offer some help, but unfortunately they merely increase the level of sound and do not compensate for distortions to discrete sounds.

Noise may also cause physiological alterations other than just to the ear. Brief intense sounds over 70 decibels can manifest changes in the smooth muscles and glands which can affect an individual's heartbeat, alter breathing, constrict blood vessels and affect digestion. While such effects have been observed, conclusions have not been documented.

Sleep Interference

Environmental noise can affect the ability to get to sleep and remain in various stages of sleep. Regardless of age, studies have indicated that adaptation to sleep interference is virtually nonexistent. Additionally, if sleep disturbances are persistent enough to cause sleep loss, it can eventually lead to a general decline of both the psychological and physiological status of human beings.

Speech/Communication Interference

Interference with speech is perhaps the most noticeable affect of noise impact. Background noise in urban communities (90 dB) can sometimes reach levels five times as loud as normal conversation (60 dB) and may make communications all but impossible. (See Figure A-1 on the following page.)

This masking effect (the drawing out of less intense sound by more intense sound) explains why certain sounds such as the ticking of a clock are perceptible in relatively quiet environments and unnoticeable in noisier ones, and conversely

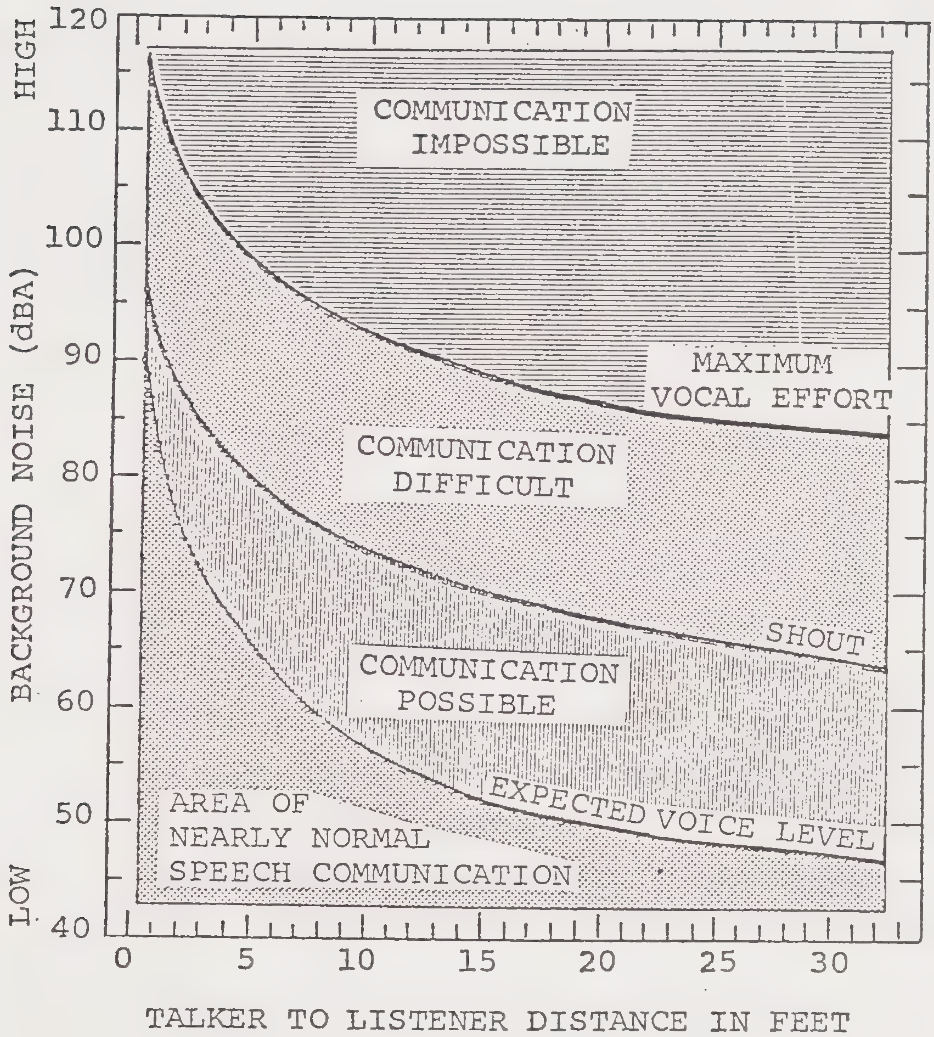


Figure 2

QUALITY OF SPEECH COMMUNICATION IN RELATION TO DISTANCE BETWEEN THE TALKER AND THE LISTENER.

why extremely loud noise sources such as a motorcycles (90 dBA) appear quieter in an urban setting (70 dBA) than in a quiet residential community (40 dBA). All people have experienced speech interferences at one time or another such as when a passing vehicle or airplane makes speech communication all but impossible for a short period of time. Both the old and the young are especially subject to speech interferences but for different reasons. The old have usually suffered some hearing loss over the years and consequently have trouble defining certain sound levels. Conversely, small children have difficulty understanding adults because they have not yet learned to distinguish between the sounds of words and environmental noise.

Annoyance

As previously stated, noise is unwanted sound. People may be adversely affected by noise due to their individual perception of varying patterns, frequency, time of occurence and levels of sounds.

Psychologists and psychiatrists have conducted extensive research in the area of sound annoyance and have concluded that a continuous level of sound or impulse over various relative time periods can cause adverse psychological responses ranging from pleasure to fear and unconscious disruptions of the nervous system.

The most annoying documented aspect of noise is the interference of normal television viewing. The second most annoying situation is the interference of speech, both in the home and outside situations (i.e., schools and offices) as discussed above. Beyond the more conscious noise annoyance factors, it has been observed that noise can create anxiety, depression, and general disorientation due to continued mental annoyance by unwanted noise.

Structural Effects

Sonic booms can have a severe affect to structures causing damage to windows and plaster, however, these impacts can usually be controlled within urban areas as not to produce any environmental affects. Vibrations to fragile structures can be caused by large trucks, trains, and heavy construction, though such occurences are rare and damage is normally slight. Sonic booms and vibrations to structures are secondary affects of noise and can frequently produce startle, temporary discomfort and annoyance to individuals.

Appendix C

FEDERAL AND STATE
NOISE STANDARDS

Appendix C

FEDERAL AND STATE NOISE STANDARDS

The federal and State governments have established noise guidelines and regulations for the purpose of protecting citizens from potential hearing damage and various other adverse physiological, psychological, and social effects associated with noise.

The first federal efforts regulating noise were issued by the Department of Labor in 1969 establishing noise as an occupational health hazard. As a result, two legislative acts have been enacted that regulate noise from industrial fixed-point sources resulting in hearing loss. The Walsh-Healey Public Contracts Act as amended includes provisions for occupational noise regulations. Failure by a corporation to comply with the established standards may result in the corporation's removal from a list of bidders eligible for federal contracts.

The Occupational Safety and Health Act (OSHA) of 1970 sets noise exposure standards as follows for all businesses engaged in interstate commerce:

Table 2. PERMISSIBLE NOISE EXPOSURES

Duration, Hours Per Day	Sound Level dBA
8	90
6	92
4	95
3	97
2	100
1	105

In 1972, Congress enacted the Noise Control Act. This act authorized the Environmental Protection Agency (EPA) to publish descriptive data on the effects of noise and establish levels of noise "requisite to protect the public health and welfare with an adequate margin of safety." These levels are separated into health (hearing loss levels) and welfare (annoyance levels) as follows:

Table 3. SUMMARY OF NOISE LEVELS REQUISITE TO PROTECT PUBLIC HEALTH AND WELFARE

Effect	Level
Hearing Loss	70 dB[1]
Outdoor activity interference and annoyance	55 dB[2]
Indoor activity interference and annoyance	45 dB[2]

[1]Averaged over a 24-hour period.

[2]Averaged over a 24-hour period with a 10-dB nighttime (10:00 p.m. to 7:00 a.m.) weighting.

The levels are designed to ensure reliable speech communication at about 5 feet in the outdoor environment. The EPA cautions that their identified levels are not standards because they do not take into account the cost or feasibility of the levels. The EPA concludes that 24-hour continuous noise levels should be below 70 dBA to minimize the risk of hearing loss. For outdoor and indoor environments, interference with activity and annoyance will not occur if levels do not exceed 55 dBA and 45 dBA, respectively.

The Federal Highway Administration (FHWA) and the Department of Housing and Urban Development (HUD) are two federal agencies that have established noise level criteria for various

types of land use. The FHWA has established noise standards for land use criteria for use in the planning and designing of highways as shown in Table 4.

Table 4. DESIGN NOISE LEVEL/LAND USE RELATIONSHIPS

Noise Level (dBA)[1]	Description of Land
60 (Exterior)	Tracts of land in which serenity and quiet are of extraordinary significance and serve an important public need — i.e., amphitheaters, parks and open space.
70 (Exterior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, picnic areas, recreation areas, playgrounds, active sport areas, and parks.
75 (Exterior)	Developed lands not included in the above categories.
55 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals and auditoriums.

[1]Maximum continuous noise level permitted 90 percent of the time during the day.

Exterior noise levels apply to outdoor areas which have regular human use and in which a lowered noise level would be of benefit. The noise level values need not be applied to areas having limited human use or where lowered noise levels would produce little benefit. The indoor level relates to indoor activities where no exterior noise-sensitive land use or activity is identified.

HUD has established policies for granting financial support for the construction of residential dwellings in noise-impacted areas as shown below:

Table 5. EXTERNAL NOISE EXPOSURE STANDARDS FOR NEW CONSTRUCTION

Acceptable	— Does not exceed 45 dBA more than 30 minutes per 24 hours.
Discretionary	— Normally acceptable - does not exceed 65 dBA more than 8-hours per 24 hours.
Discretionary	— Normally - unacceptable - exceeds 65 dBA 8 hours per 24 hours.
Unacceptable	— Exceeds 80 dBA 60 minutes per 24 hours. Exceeds 75 dBA 8 hours per 24 hours.

Any noise environment that exceeds 65 dBA for 8 hours per day is considered normally unacceptable and requires certain measures to reduce noise levels in the living quarters. Also, noise reduction methods need to be presented to the Regional Administrator of the Federal Housing Authority (FHA) for approval before financial assistance or support is granted. Beyond these requirements, HUD personnel at the local level must assess the acceptability of noise exposure in indoor sleeping areas. These areas are considered acceptable if the noise levels:

> ...do not exceed 55 dBA for more than ... 60 minutes in any 24-hour period and do not exceed 45 dBA for more than 30 minutes ... from 11:00 p.m. to 7:00 a.m. and do not exceed 45 dBA for more than ... 8 hours in any 24-hour day.

A general comparison of Federal Noise Standards is shown in Table 6. These standards are shown for a maximum recommended per 24-hour period although levels may be exceeded for shorter periods of time. However, these higher levels must be offset by even quieter levels of noise the remaining period of time.

The State of California has also adopted noise standards in areas of regulation not pre-empted by the federal government. State standards regulate noise levels of motor vehicles, establish noise impact boundaries around airports, and set noise insulation standards as shown in Table 7.

Table 6. GENERAL COMPARISON OF FEDERAL NOISE STANDARDS

A-Weighted Sound Pressure Level dBA	Maximum Recommended Duration for 24-Hour Period				
	OSHA Industrial Limits	EPA Limits		HUD Limits (Exterior)	FHWA Limits (Exterior)
		Health	Annoyance		
45			Indoor	Acceptable	
50					
55			Outdoor		
60					Public Open Space
65				Discretionary	
70		Hearing Loss			Residential, etc.
75					Other Developed Lands
80					
85	Permissible			Unacceptable	
90				Unacceptable	

Table [illegible] STATE OF CALIFORNIA NOI[illegible] STANDARDS

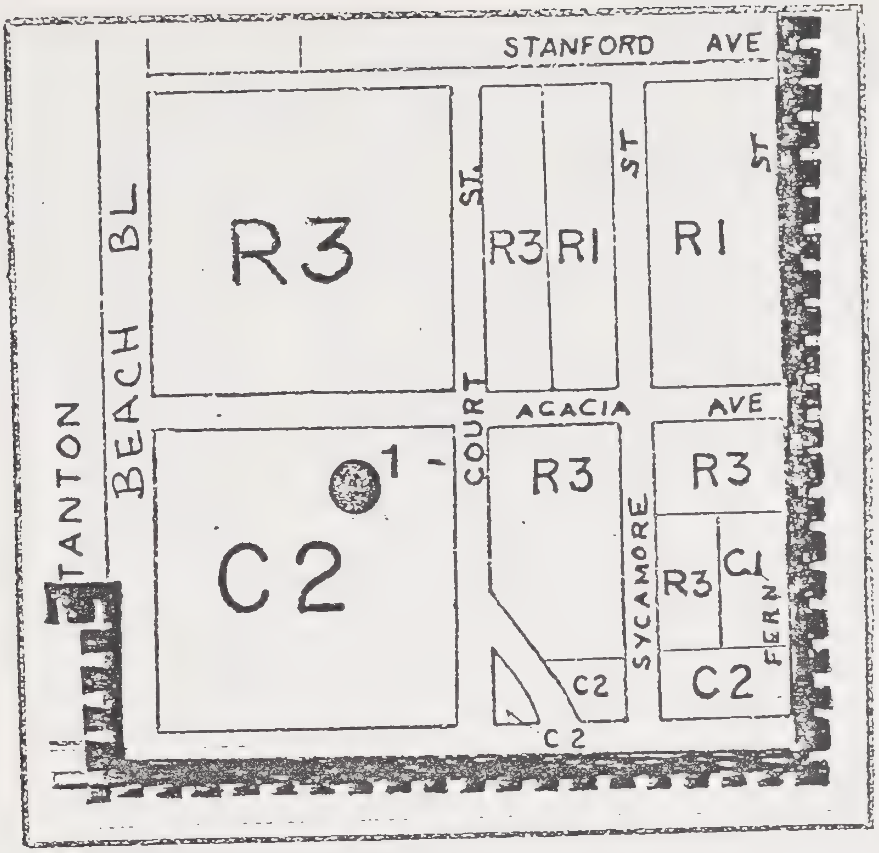
Description	Noise Standards (dBA values at 50 feet unless noted otherwise		
Operation of vehicles at posted speeds:	Effective Date	35 MPH or less	Over 35 MPH
1. Motorcycle		82	86
2. Vehicle with a GVW of 6000 lb. or more (or combination)	Before 1/1/73	88	90
	After 1/1/73	86	90
3. Any other motor vehicle and any combination of motor vehicles towed by such vehicle		76	82
Sale of new vehicles			
1. Motorcycles manufactured	Before 1970		92
2. Motorcycles, other than motor driven cycles manufactured	After '69, Before '73		88
	After '72, Before '75		86
	After '74, Before '78		80
	After '77, Before '88		75
	After '87		70
3. Vehicle with a GVW of 6000 lb. or more	After '67, Before '73		88
	After '72, Before '75		86
	After '74, Before '78		83
	After '77, Before '88		80
	After '87		
4. Any other motor vehicle	After '67, Before '73		86
	After '72, Before '75		84
	After '74, Before '78		80
	After '77, Before '88		75
	After '87		
Noise level limits for the operation of off highway motor vehicles	Any vehicle manufactured on or after 1/1/72 before 1/1/73		92
	after 1/1/73 before 1/1/75		88
Establish Noise Impact Boundary around airports	(in CNEL units at ground level)		
New Airports	65 dB		
Existing large airports	Before 1/1/76	80 dB	
	After 1/1/76	75 dB	
	After 1/1/81	70 dB	
	After 1/1/81	65 dB	
Existing small airports	Before 1/1/76	70 dB	
	After 1/1/81	65 dB	
Noise Insulation Standards	(in CNEL units) 45 dB interior 60 dB or greater requires analysis		

CNEL = Community Noise Equivalent Level

Appendix D

MEASUREMENT DATA

Site Number — 1



Measurement Location — Sixty feet south from the curbside of Acacia Street and west 144 feet from the centerline of Court Avenue next to the trailer park.

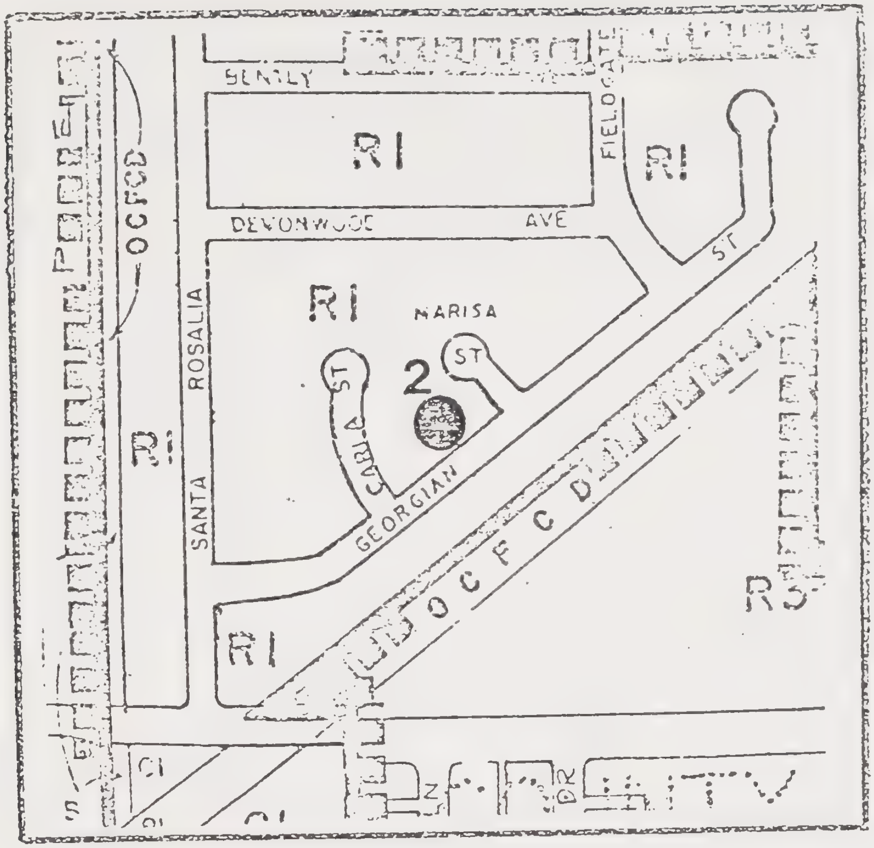
Noise Sources — Mixed traffic, cars, motorcycles, Garden Grove Freeway, diesel truck, and train whistle.

Measurement Values (dBA) —

	Day	Night
Residual —	45-50	45-50
Mode —	50-55	50-55

Comments — During night measurements, traffic noise from the Garden Grove Freeway was distinguishable.

Site Number — 2



Measurement Location — The northwest corner of Marisa Street and Georgian Street, 45 feet in from the centerlines.

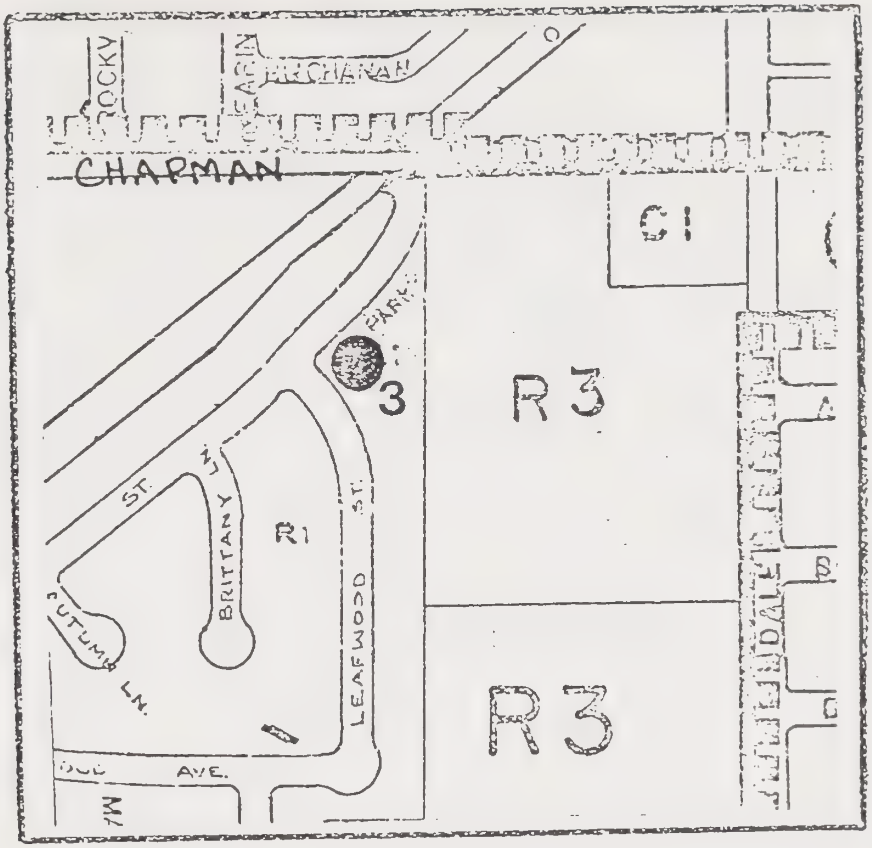
Noise Sources — Cars, construction noise, trucks, children playing, general aviation, and a hot rod and jet overflight at night.

Measurement Values (dBA) —

	Day	Night
Residual —	40-45	40-45
Mode —	45-50	45-50

Comments — A variety of noise sources were present during the day. At night, however, general aviation set the noise level.

Site Number — 3



Measurement Location — Premier Park, 210 feet from the centerline of Leafwood Street and 60 feet from Briarwood Street.

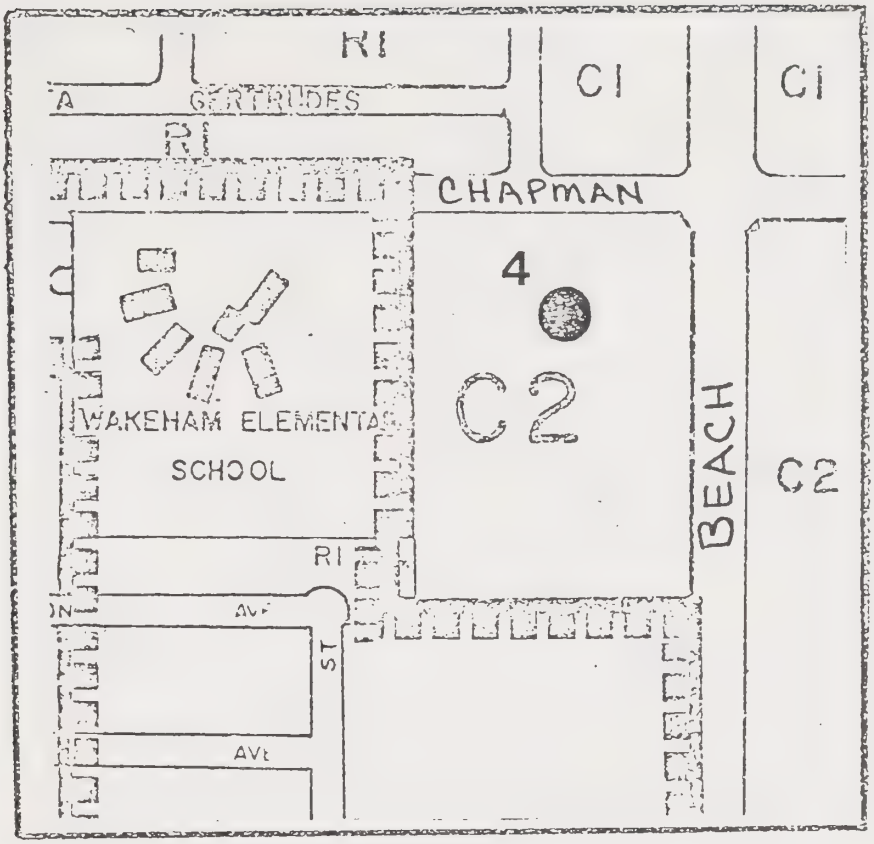
Noise Sources — Cars, hot rod, pickup and jet overflight at night.

Measurement Values (dBA) —

	Day	Night
Residual —	40-45	40-45
Mode —	45-50	40-45

Comments — This park site was relatively quiet with surface traffic causing an intrusion of noise.

Site Number — 4



Measurement Location — Southwest corner of Chapman Avenue and Beach Boulevard, 300 feet from the centerlines.

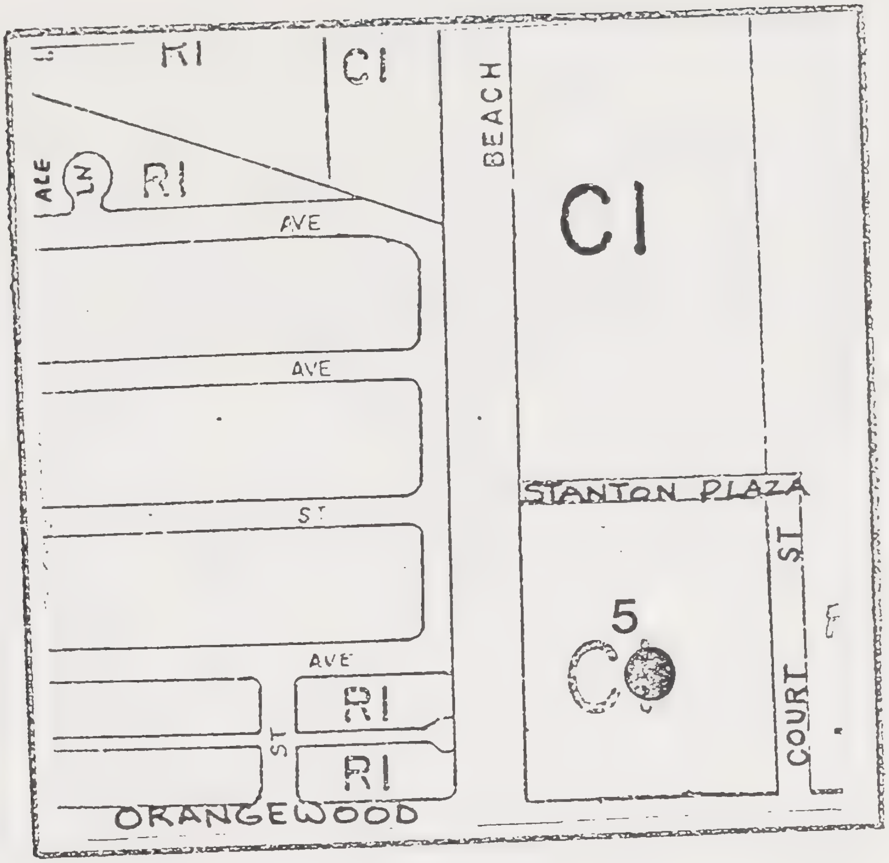
Noise Sources — Diesel trucks, cars, hot rods.

Measurement Values (dBA) —

	Day	Night
Residual —	55-60	45-60
Mode —	60-65	50-60

Comments — Diesel trucks were a major noise source at this site resulting in the second highest day mode measurement and day residual measurement of all the sites.

Site Number —5



Measurement Location — Rear of Mobil Station, 220 feet from the Beach Boulevard centerline and 280 feet from the Orangewood Avenue centerline.

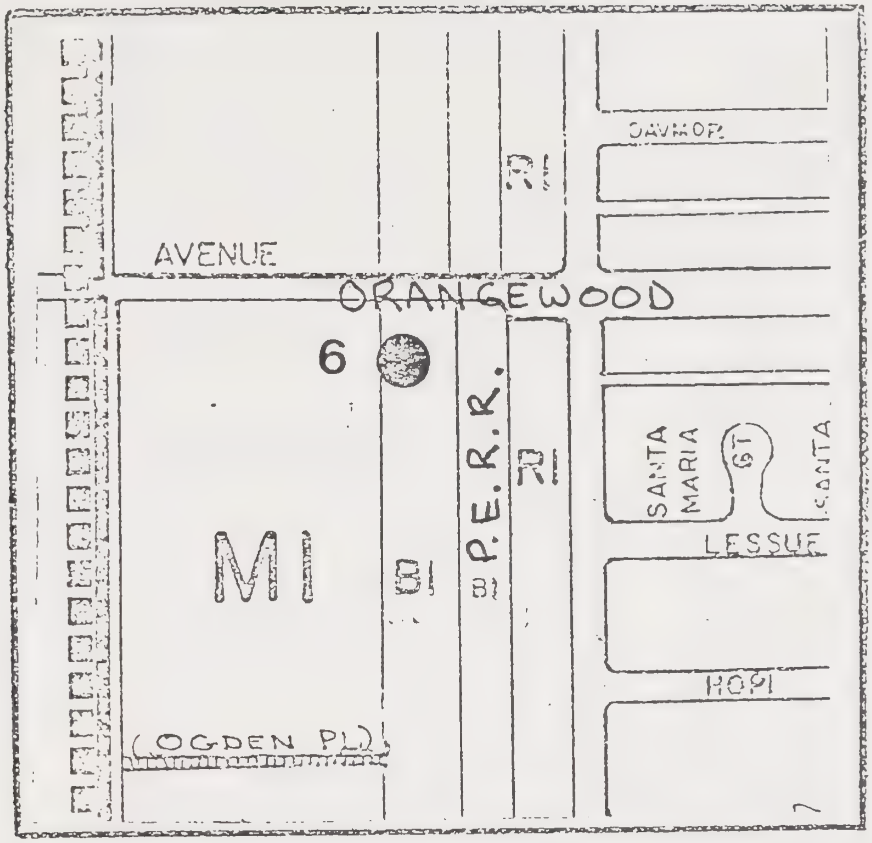
Noise Sources — Cars, motorcycles, hot rod, sports cars, and trucks.

Measurement Values (dBA) —

	Day	Night
Residual —	50-55	45-50
Mode —	55-65	50-55

Comments — This site was characterized by stop and go traffic on Beach Boulevard.

Site Number — 6



Measurement Location — South of Orangewood Avenue and 50 feet west of the Pacific Electric Railroad right-of-way.

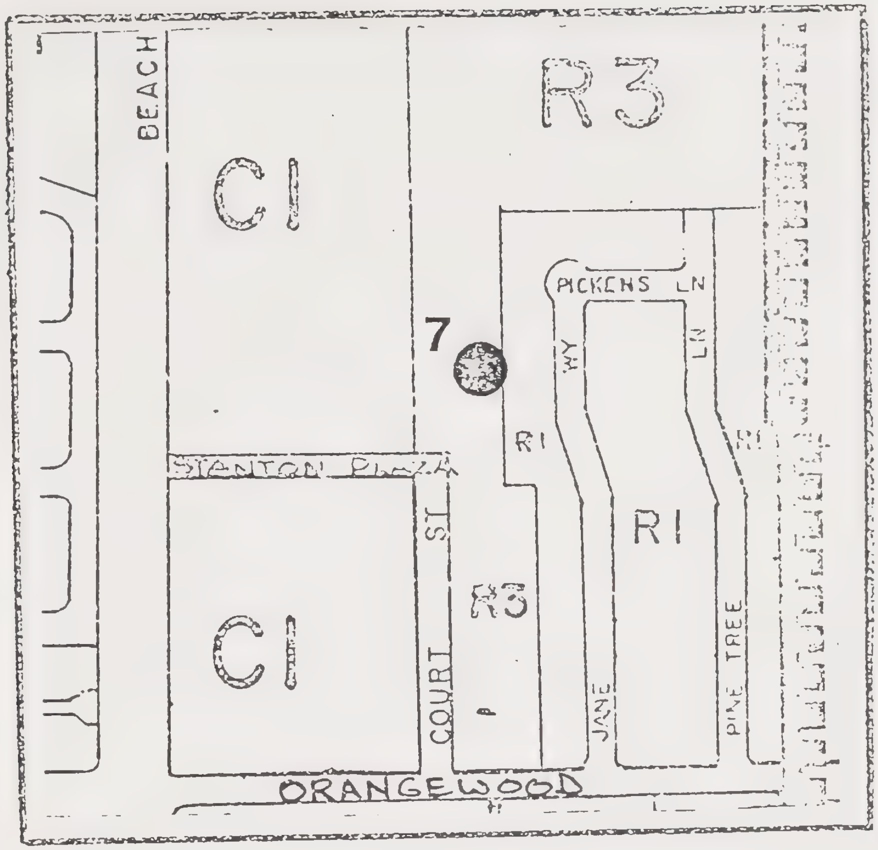
Noise Sources — Jet aircraft fly-overs, general aviation, dogs, and powerline leakage noise at night.

Measurement Values (dBA) —

	Day	Night
Residual —	45-50	45-50
Mode —	40-45	45-50

Comments — Distant aircraft operations were noise sources at this site.

Site Number — 7



Measurement Location — Northeast corner of Stanton Plaza and Court Street near the mobile home park.

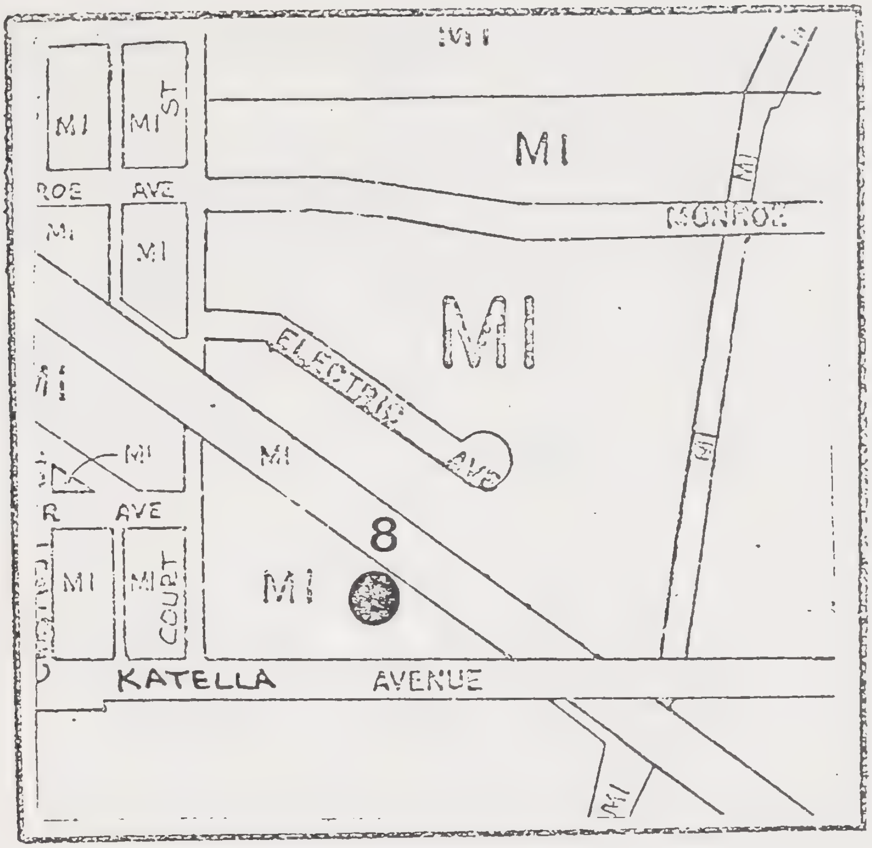
Noise Sources — Jet aircraft and car horns.

Measurement Values (dBA) —

	Day	Night
Residual —	45-50	40-45
Mode —	50-55	45-50

Comments — Quiet site with jet aircraft and car horns in the background.

Site Number — 8



Measurement Location — One-hundred feet from the curbside of Katella Avenue and 350 feet from Court Street, across the street from Industrial Asphalt, Livingston Graham Ready Mix, and Orco Block.

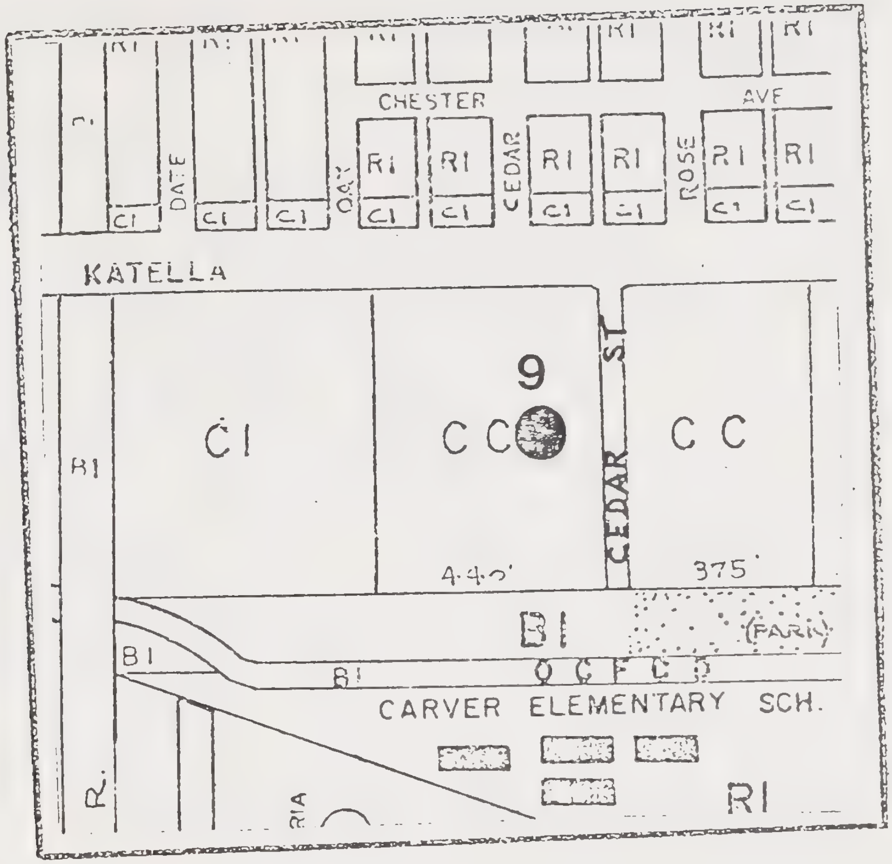
Noise Sources — Cars, motorcycles, sports cars, and diesel trucks.

Measurement Values (dBA) —

	Day	Night
Residual —	45-50	40-45
Mode —	55-65	45-50

Comments — Truck and car traffic were the major sources of noise at this site.

Site Number — 9



Measurement Location — Rear of City Hall, 300 feet from the Katella Avenue curbside and 100 feet from the curbside of Cedar Street.

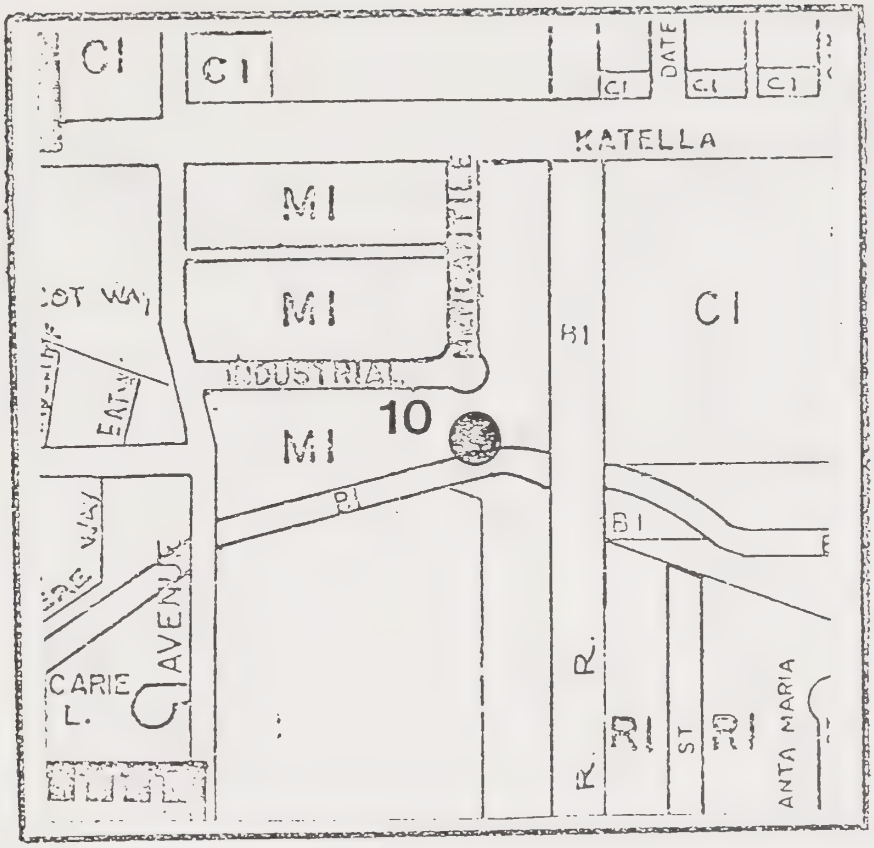
Noise Sources — Air conditioning and hot rods.

Measurement Values (dBA) —

	Day	Night
Residual —	45-50	45-50
Mode —	50-55	50-55

Comments — Air conditioner noise from the Stanton Community Hospital was evident at this location.

Site Number — 10



Measurement Location — One-hundred feet west of the Pacific Electric Railroad right-of-way and 100 feet south of Industrial Way.

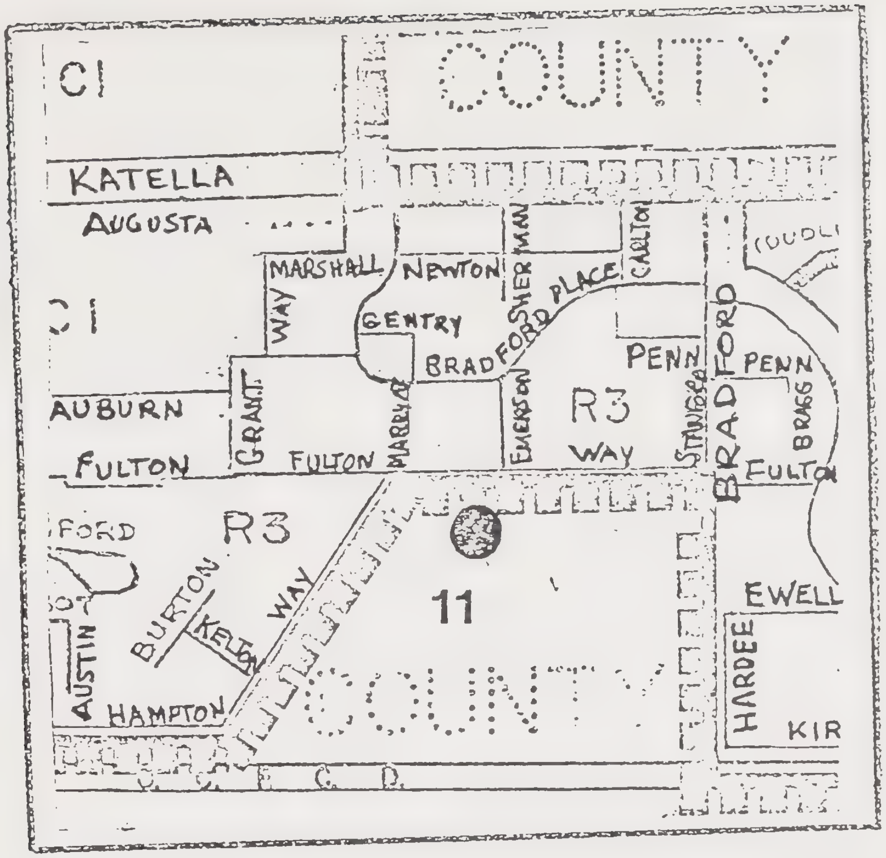
Noise Sources — Traffic, jet aircraft, general aviation, and children.

Measurement Values (dBA) —

	Day	Night
Residual —	45-40	45-50
Mode —	50-55	45-50

Comments — Jet and general aviation aircraft noise were recorded at this site during the day and night.

Site Number — 11



Measurement Location — Day measurement site at the County trash transfer station was snifted at night to 40 feet south of Fulton Way near the condominiums.

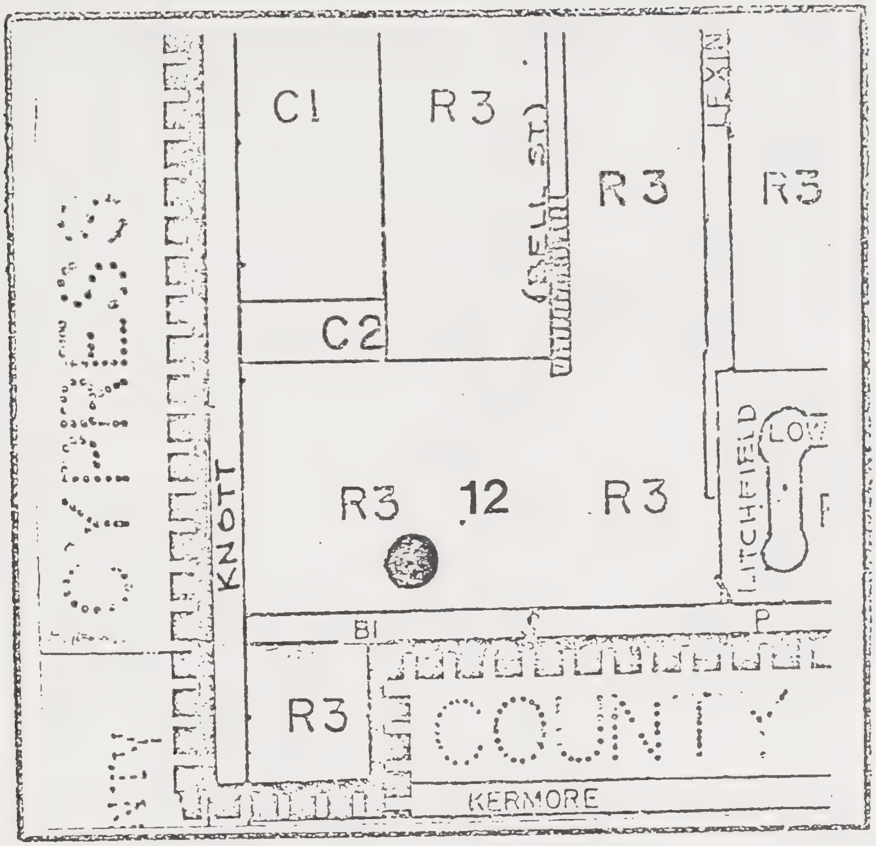
Noise Sources — Sports cars, general aviation, small helicopters and jet aircraft overflight.

Measurement Values (dBA) —

	Day	Night
Residual —	45-40	45-50
Mode —	45-50	45-50

Comments — Traffic was extremely sparce at this location.

Site Number — 12



Measurement Location — One-hundred feet north of the Pacific Electric Railroad right-of-way and 300 feet east of the Knott Avenue curbside.

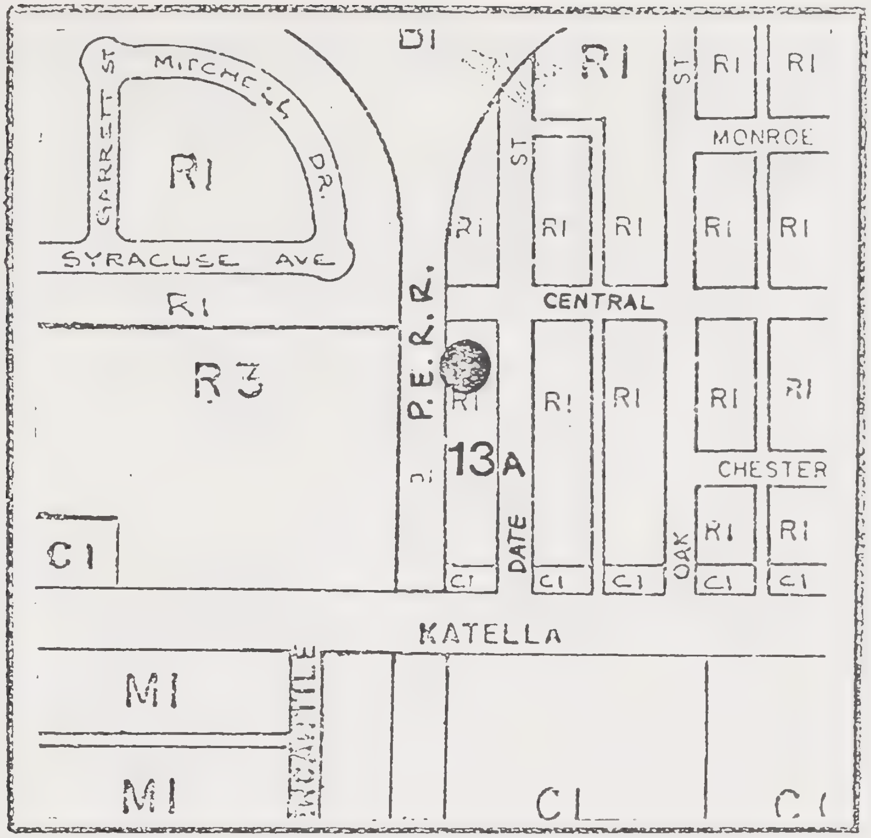
Noise Sources — Dogs in kennel, children, rooster, trucks, motorcycles, and hot rods.

Measurement Values (dBA) —

	Day	Night
Residual —	45-50	40-45
Mode —	50-55	40-45

Comments — Dogs barking in the kennel were the primary source of noise.

Site Number — 13A



Measurement Location — Six-hundred feet north of Katella Avenue on the Pacific Electric Railroad right-of-way.

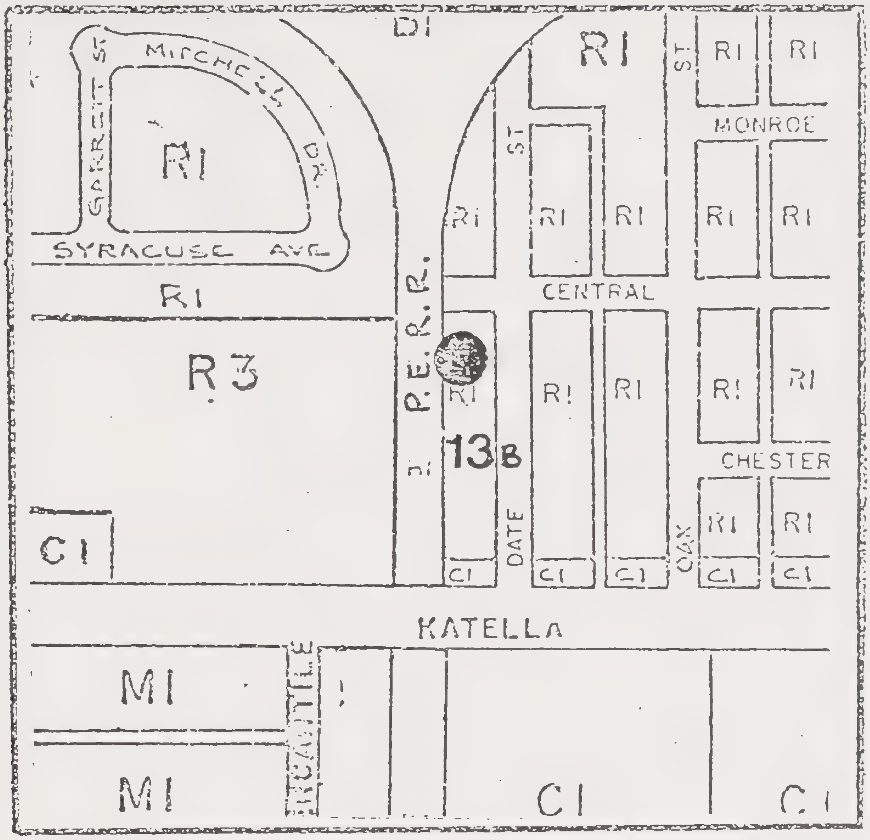
Noise Sources — General aviation, dogs, and train whistle.

Measurement Values (dBA) —

	Day	Night
Residual —	40-45	45-50
Mode —	45-50	45-50

Comments — The measurements at this location can be compared to site number 13B which had a number of train movements involved.

Site Number — 13B



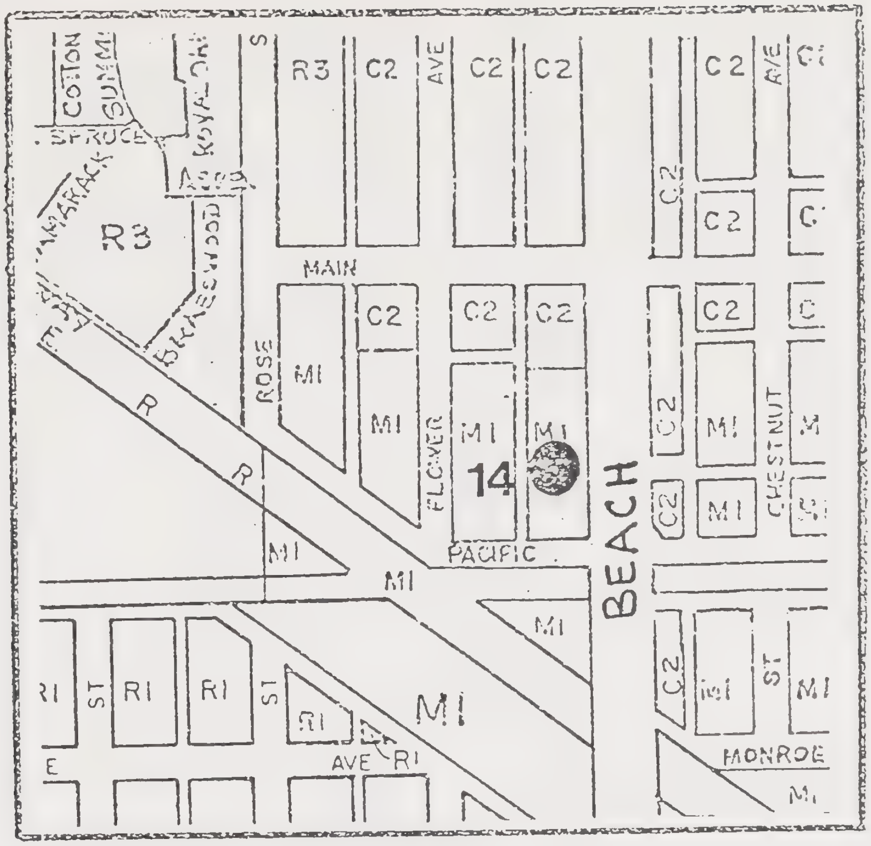
Measurement Location — Same as 13A.

Noise Sources — Train braking, backing up, and switching.

Measurement Values (dBA) —

	Day	Night
Residual —	50-55	45-50
Mode —	65-70	45-50

Comments — Train movements were the major source of noise resulting in the highest day mode noise level of all the sites.



Measurement Location — Northeast corner, 75 feet from Cedar Street and 200 feet from Pacific Avenue.

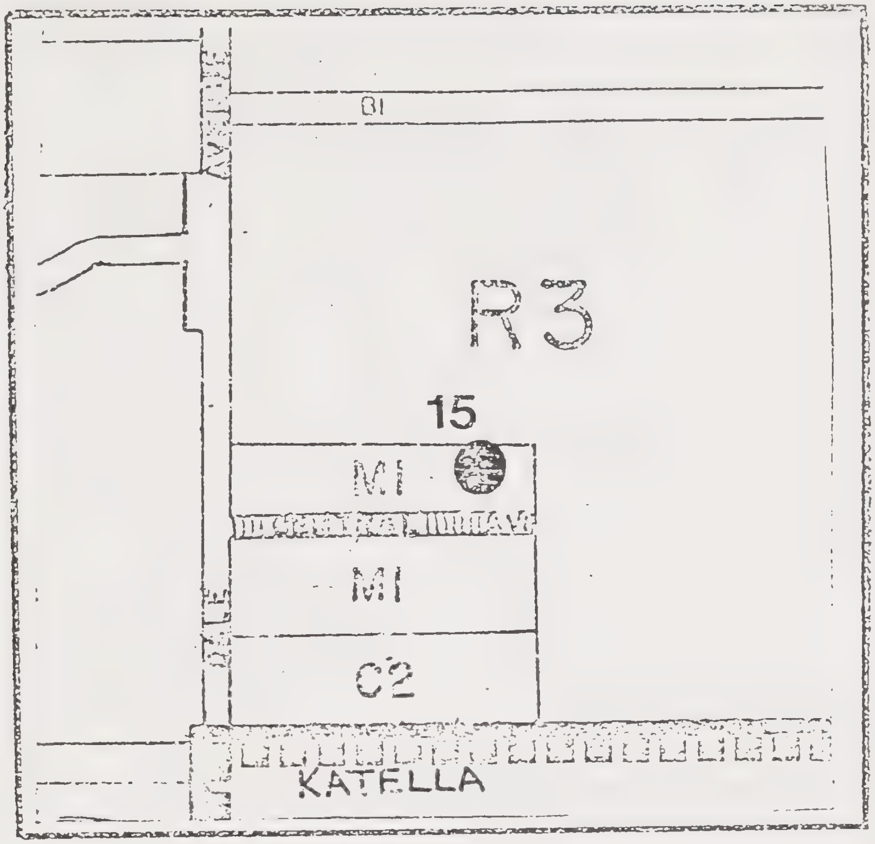
Noise Sources — Traffic on Beach Boulevard, trucks, and general aviation.

Measurement Values (dBA) —

	Day	Night
Residual —	45-50	40-45
Mode —	50-55	40-45

Comments — Traffic on Beach Boulevard contributed to the noise level at this location.

Site Number — 15



Measurement Location — 8625 Central Avenue near the trailer park.

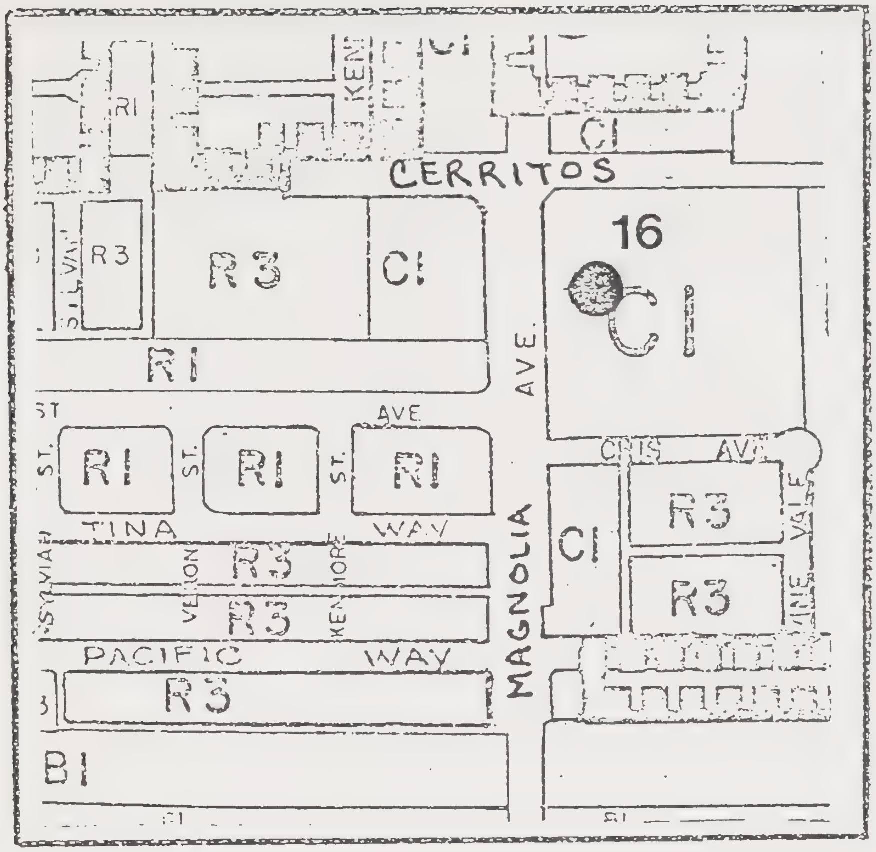
Noise Sources — General aviation, car, milling machine, and train whistle.

Measurement Values (dBA) —

	Day	Night
Residual —	50-55	40-45
Mode —	50-55	40-45

Comments — A milling machine at the adjacent industrial center set the residual noise levels during the day.

Site Number — 16



Measurement Location — Market Basket Shopping Center, 220 feet from the curbside of Cerritos Avenue and 90 feet from Magnolia Avenue.

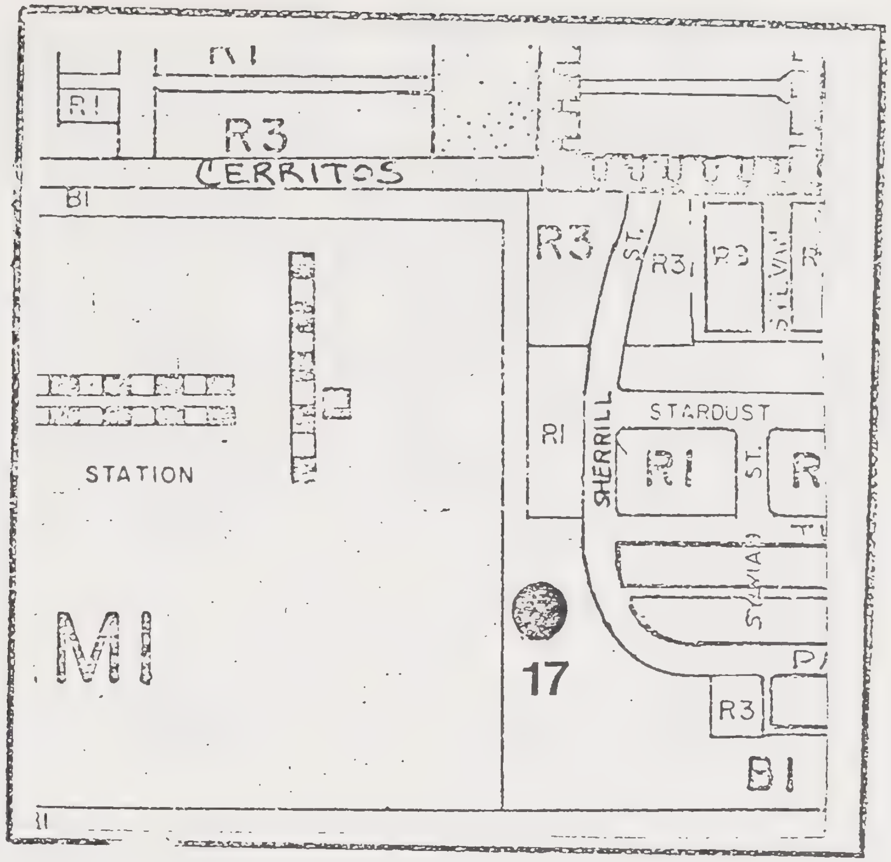
Noise Sources — Pickup, sports cars, van, car and hot rod.

Measurement Values (dBA) —

	Day	Night
Residual —	50-55	40-45
Mode —	55-60	40-45

Comments — A mixture of traffic noise sources intruded at this location.

Site Number — 17



Measurement Location — Forty-five feet west of the Sherril Street curbside between Tina Way and Pacific Way.

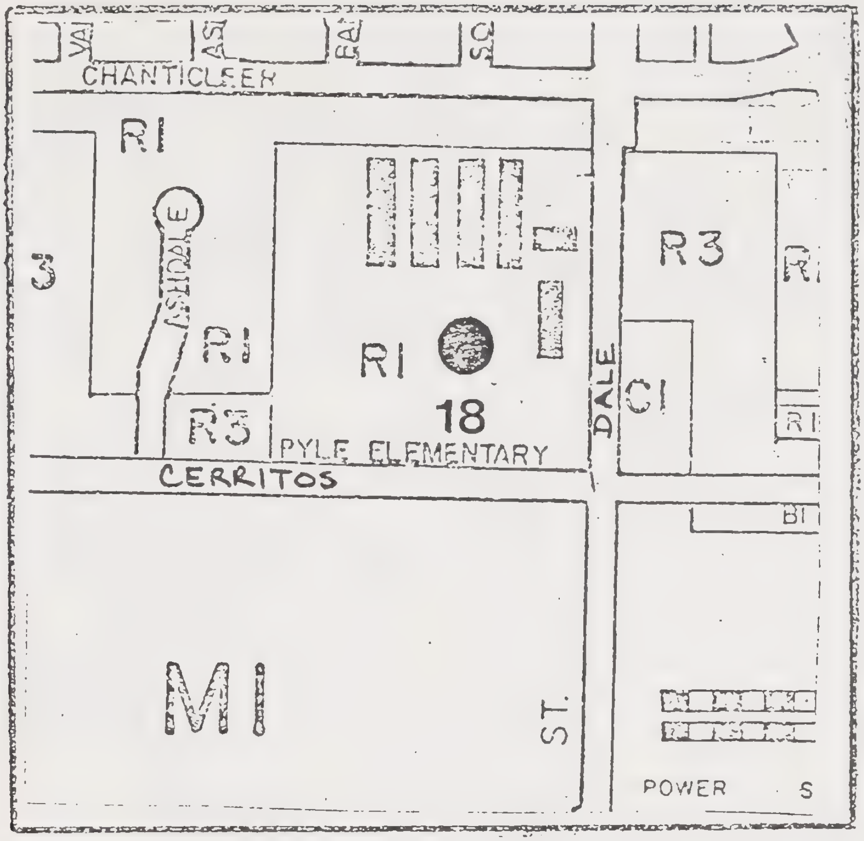
Noise Sources — Cars, VW, general aviation, substation hum, and jet aircraft overflight.

Measurement Values (dBA) —

	Day	Night
Residual —	45-40	45-50
Mode —	50-55	45-50

Comments — A substation hum set the nighttime residual noise level.

Site Number — 18



Measurement Location — Playground at Pile Elementary Schoo, 300 feet from the curbsides of Cerritos and Dale Avenues.

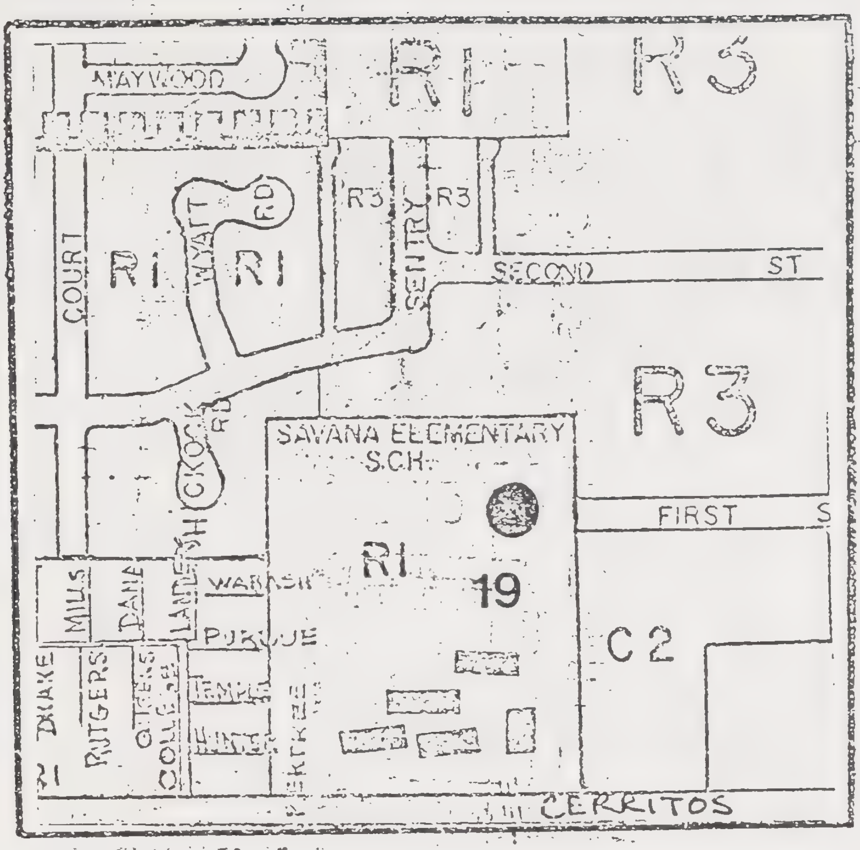
Noise Sources — General aviation.

Measurement Values (dBA) —

	Day	Night
Residual —	45-50	40-45
Mode —	50-55	45-50

Comments — The only distinguishable noise sources were general aviation operations.

Site Number — 19



Measurement Location — Savana Elementary School, 40 feet west of First Street.

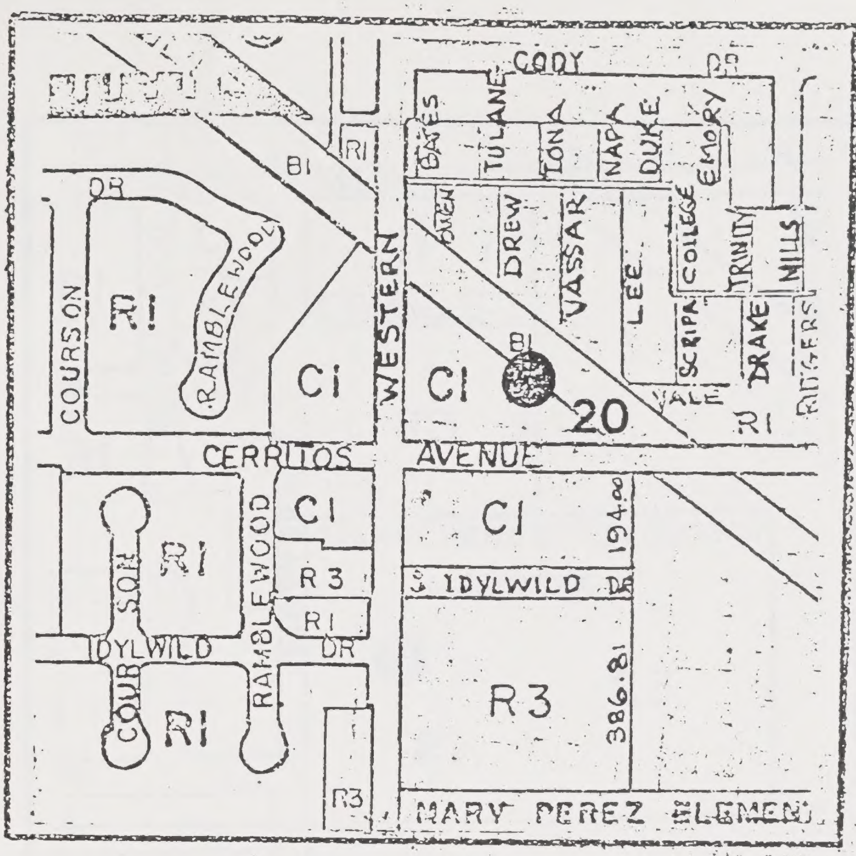
Noise Sources — No distinguishable noise sources.

Measurement Values (dBA) —

	Day	Night
Residual —	45-50	40-45
Mode —	45-50	40-45

Comments — Few intrusive noises were evident either day or night.

Site Number — 20



Measurement Location — Northeast corner, 300 feet from the Western Avenue curbside and 100 feet from the Cerritos Avenue curbside.

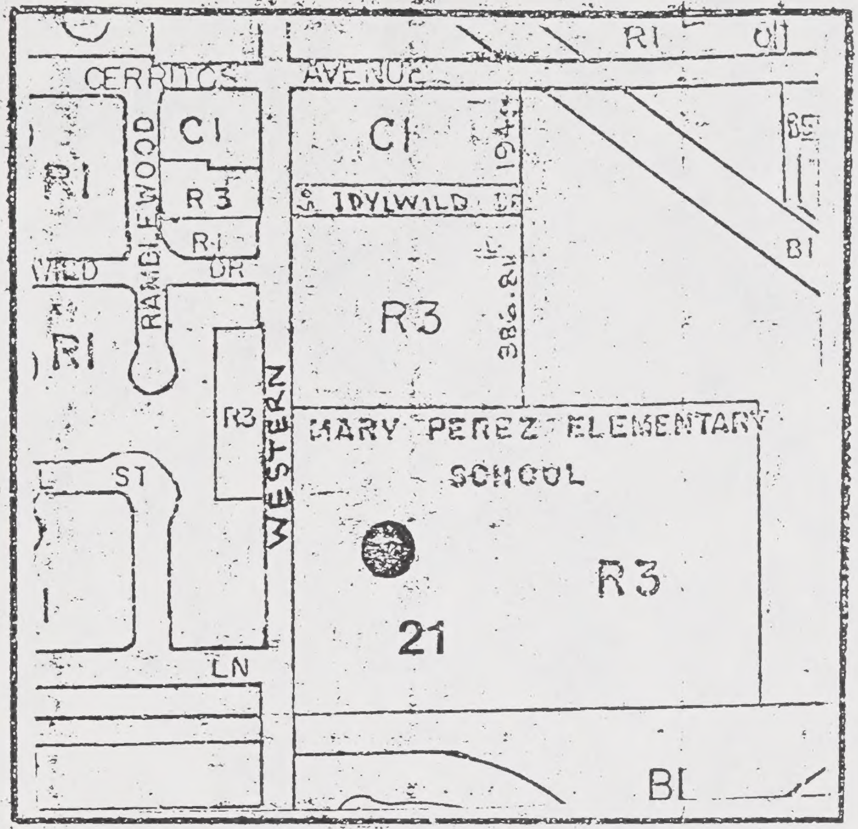
Noise Sources — Mixed traffic, 2-engine propeller aircraft, motorcycles, and jet overflight.

Measurement Values (dBA) —

	Day	Night
Residual —	45-50	35-40
Mode —	50-55	40-45

Comments — The lowest night residual noise levels were recorded at this site and site 21.

Site Number — 21



Measurement Location — Mary Perez Elementary School, 150 feet from the Western Avenue curbside and 300 feet from the Pacific Electric Railroad.

Noise Sources — Charter bus and VW.

Measurement Values (dBA) —

	Day	Night
Residual —	45–50	35–40
Mode —	50–55	40–45

Comments — This site and site 20 had the lowest night residual noise readings.